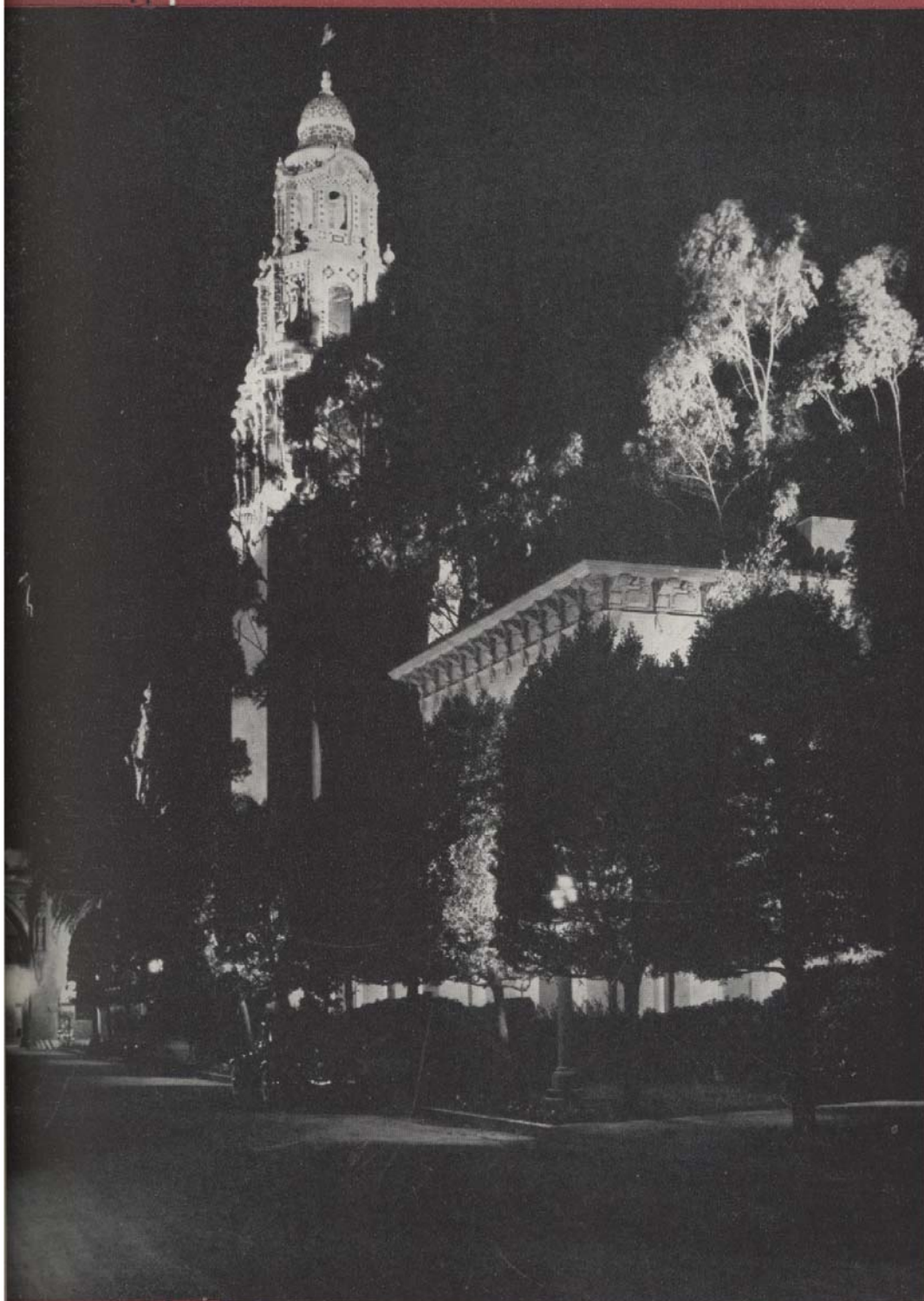


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THE MAGAZINE OF

LIGHT

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*Light
and Color at*
**the SAN DIEGO
EXPOSITION**

By Alston Rodgers

EACH succeeding "World's Fair" or "International Exposition" seems to bring forth some outstanding contribution to the art and science of lighting. The forward-thinking spirit of these celebrations affords an opportunity for the artist, the designer, the architect, and the engineer to unleash imagination and work together for the advance of lighting technique and appreciation. Certainly the beautiful California-Pacific International Exposition of 1935 has strengthened the precedent in this field of creative lighting effort.

There were many who expected this exposition to carry forward the lighting schemes of Chicago's successful "Century of Progress" celebration with new structural forms combining lighting and color as an integral part of modern architec-

tural design. While there were several excellent examples of advanced structural lighting to be seen at the San Diego exposition, its significant contribution to lighting was artistic application of color lighting to settings of great natural and architectural beauty.

The black and white illustrations accompanying this article convey the idea that the buildings and grounds were delicately floodlighted. But colorless photography must leave to the imagination the impressions of a canyon full of palms and ferns turned by lighting into a picture of rare tints and luminous shadows; or of a formal garden from the courts of old Spain with its brilliant flowers and sparkling fountains or of the patio of a Spanish Renaissance palace with the delicate fronds of tropical plants and ferns seen in lacelike silhouette against warm amber-lighted walls. There

was not a trace of the common variety of colored lighting as seen in the past, where large areas were flooded indiscriminately with elementary reds, greens, and blues. Each scene was carefully studied from every vantage point, and an artistic lighting picture was built up with the lighting carefully controlled to create centers of interest and furnish harmonious backgrounds and settings. The careful selection and combination of pastel tints with a few brilliant primary highlights successfully avoided any suggestion of a "riot of color." By night each building, courtyard, patio, garden, and leafy glen became a separate luminous composition in color and shade.

Inspiration from the Setting

The semi-tropical verdure of Southern California in Balboa Park afforded an ideal background for the exposition. This park was the scene of the San Diego exposition of 1915, and it was during the recent renovation of the twenty-year-old group of permanent buildings from this fair that the idea of the present exposition was conceived. This group of stately Spanish and Spanish-Colonial palaces forming the Plaza del Pacifico is the center of the exposition. In planning new buildings and landscaping, it was decided that all structures and embellishments must be suited both historically and climatically to the Southwest. Consequently, many buildings of historic and prehistoric architecture, including the Pueblo, Aztec and Mayan, were found closely associated with buildings of extremely modern design, but all have been cleverly adapted to the climate and traditions of Southern California.

It was, of course, apparent from the outset that to make these elements of natural and man-made beauty present an outstanding spectacle by night, it would be necessary to decide upon some lighting scheme appropriate to the charm of the setting and consistent with the spirit of the exposition. Much credit goes to the Otto K. Olesen Illuminating Company, Ltd., of Hollywood, California, for the conception which eventuated.

How Mr. Olesen's lighting scheme was originated and carried out is an interesting story. It all began with a Maxfield Parrish painting on an Edison MAZDA lamp calendar in Mr. Olesen's office. In common with most of the rest of us, he had always admired and marveled at the delicate colorings of flowers and foliage, the brilliant highlights, rich blue backgrounds and luminous shadows of the Parrish paintings. If only those colors could be reproduced with light on actual foliage and buildings! But why not? Of course it would require a great deal of experimenting with the effect of various hues of light on different types of surfaces, a great deal of work on the control, direction, and intensity of the light sources, and much care in the concealing of lighting equipment—but it could be done. With this inspiration he gathered together several more Maxfield Parrish calendars and approached the exposition authorities with the proposition that the lighting theme of the fair be an attempt to duplicate in light the artistic effects achieved in these popular paintings. This scheme appeared to be the most attractive and he was authorized to make a trial installation and give a practical demonstration of his proposal.

There followed many days and nights of careful experimenting with various types of lighting equipment and practically every conceivable combination of color media. Literally every tree, shrub, bed of flowers, and wall surface was worked on experimentally to determine what combination of colors and shadows would produce the sought-for results most successfully. Finally, he and his assistants succeeded in achieving the effect for which they were working and the trial installation in the courtyard and gardens of the old Horticultural Building was presented for inspection. That they were successful in painting an extremely lovely picture in light and color will be confirmed by any of the thousands who paused before this scene during the fair. Its success is also attested by the fact that he got the job of planning and executing all the decorative ex-

terior lighting. And, incidentally, a large private garden lighting job was also sold on the basis of this experimental installation.

Then came the real work, for now the installations must be of a permanent nature. In some respects the San Diego weather conditions were an asset because they permitted the use outdoors of lens spotlights, large open reflecting type spotlights and other stage and studio lighting equipment without much fear of harm by rain. However, the real problem came in procuring suitable color media that would withstand the rigorous conditions of fog, salt air, and intense, color-fading sunlight. The Southern California climate may be wonderful for tourists and vacationists, but it certainly plays havoc with color screens on lighting equipment.

Solving the Color Problem

The obvious solution seemed to be in the use of colored glass plates, but in the first place, many of the necessary Maxfield Parrish colors could not be obtained in glass and even a smaller selection could be found in the heat-resisting glass necessary for the high intensity, concentrating units to be employed. As a starter, all available colors in Pyrex glass were obtained and then experiments were conducted to find the next best color materials of the other necessary hues. It was found that Transolene, a particularly tough and color-fast gelatinous color screen was quite serviceable, and this was used in many instances. However, some vital colors were available only in the common, flimsy gelatin sheets which simply would not stand up under the adverse conditions. Finally, a happy solution to this difficulty was discovered in a liquid known as "Wonder-sheen" which had been developed by a professor at the University of California in Berkeley. This liquid was originally intended for a number of protective uses including rustproofing, and the painting of ships' bottoms to preclude the growth of barnacles. It was found that the coating also protected colored gelatin from the effects of weather and retarded the

fading action due to sunlight. This treated gelatin was not as serviceable as the other screens, but by carefully locating the equipment to shade the color media from the direct rays of the sun during the daytime it was found to give quite satisfactory results.

Great care was taken in locating and concealing the lighting units to prevent glare and to hide the mechanical arrangements necessary for obtaining the effect. For the most part, the illumination was obtained by projecting powerful concentrated beams of light great distances from points completely out of the field of view, so that it was usually difficult and at times practically impossible for the observer to tell where the lighting effects were coming from. Approximately 1300 spotlights and floodlights were used in the exterior lighting. Most of the projectors were special Olesen "Sun-Lights" — an 18-inch open type spotlight with a parabolic mirror at the back accommodating 1000-watt to 2000-watt lamps and fitted with a frame for holding the color medium. Other control equipments used included G-E Handy Floodlights, G-E Exposition Floods, and wide angle projectors, and lens type units ranging from tiny baby spots to large long-range 2000-watt spotlights. Decorative garden houses, bird-houses, and pergolas were constructed to cover banks of these projectors, making them inconspicuous by day and concealing them by night. The large wall areas of most of the exposition buildings were illuminated by continuous lighting troughs concealed on the ground level behind low walls and shrubs or placed on long balconies and ledges running around the buildings about half way up the walls. These continuous troughs utilized 50-watt and 100-watt lamps on 12-inch centers, and they were formed of aluminum finished metal with a cover of amber Cel-o-glass protected by heavy wire screening across the open side. Altogether, nearly a mile of this striplight was employed.

In the old Plaza del Pacifico, the new Arch of the Future presented an inter-

esting example of the adaptations of architecture to meet the requirements of modern lighting. While the walls of the old buildings surrounding this Plaza were successfully illuminated by means of lightstrips, it was necessary to locate some high-powered projectors in the center of the Plaza to high-light the towers in soft color and to pick out the tops of the high trees behind the buildings to furnish the desired background and atmosphere. Consequently, this great arch was constructed particularly for the purpose of housing, beneath the pergola at its top, the 37, 2000-watt Olesen "Sun-Lights" and four 2000-watt long-range spotlights necessary to take care of this long-distance lighting job. The narrow shafts of light from these projectors picked out each individual tuft of foliage on every tall tree and artfully illuminated the towers and bits of architectural decoration in blended tones of pale green, amethyst, flesh pink, rich magenta, soft blue, rose and light straw. The window-like openings at the ends of the arch concealed loudspeakers for amplifying music and announcements. In each of the four great flower pots at the sides of the arch was hidden a 1000-watt G-E Exposition Floodlight with an amber Pyrex cover plate for lighting the front faces of the arch. The ends of the structure were illuminated by amber lightstrips concealed behind a border of shrubs at the edge of the pools.

The long shallow pools, filling almost

the entire Plaza, were constructed mainly for the purpose of mirroring the lighted trees and buildings at night. The bottoms of the pools were covered with gravel dyed in variegated colors to give interest to these large areas of water in the daytime.

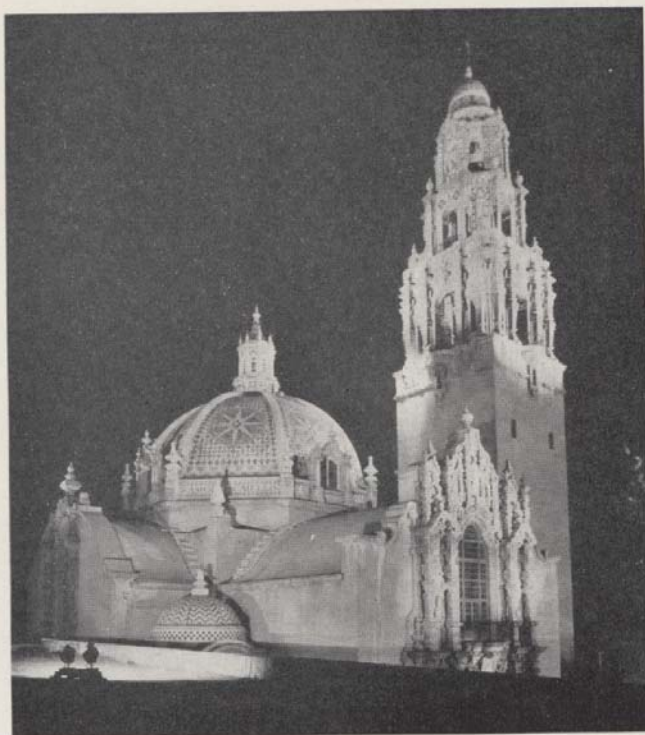
An outstanding feature of the night display was the great Aurora Borealis mounted on top of the pavilion housing the huge outdoor organ. This apparatus consisted of a bank of seven 36-inch 150-ampere, high intensity arc searchlights mounted on a 16-foot revolving turntable rotated on ball bearings by a one horsepower motor. Large screens of Transolene were used to color the powerful shafts of light which formed the constantly changing Aurora across the sky.

The Water Palace and several other privately sponsored exhibit buildings incorporated clever lighting applications in their design. An article on the Ford Building and the Standard Oil Tower to the Sun will appear in the next issue.

During the period of the fair from July 31st to November 11th nearly 5,000,000 spectators visited the exposition. On November 11th, the originally planned closing date, the gates were closed and workmen immediately began refurbishing the fair for a "bigger and better" reopening on January 15, 1936.

Note: The photographs were made particularly for this article by John Sirigo, official photographer, California Pacific International Exposition, San Diego.

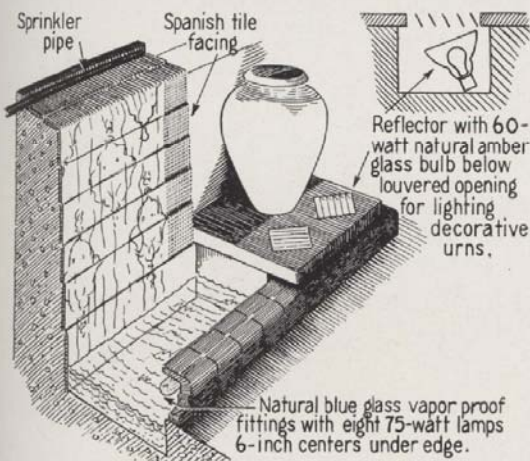
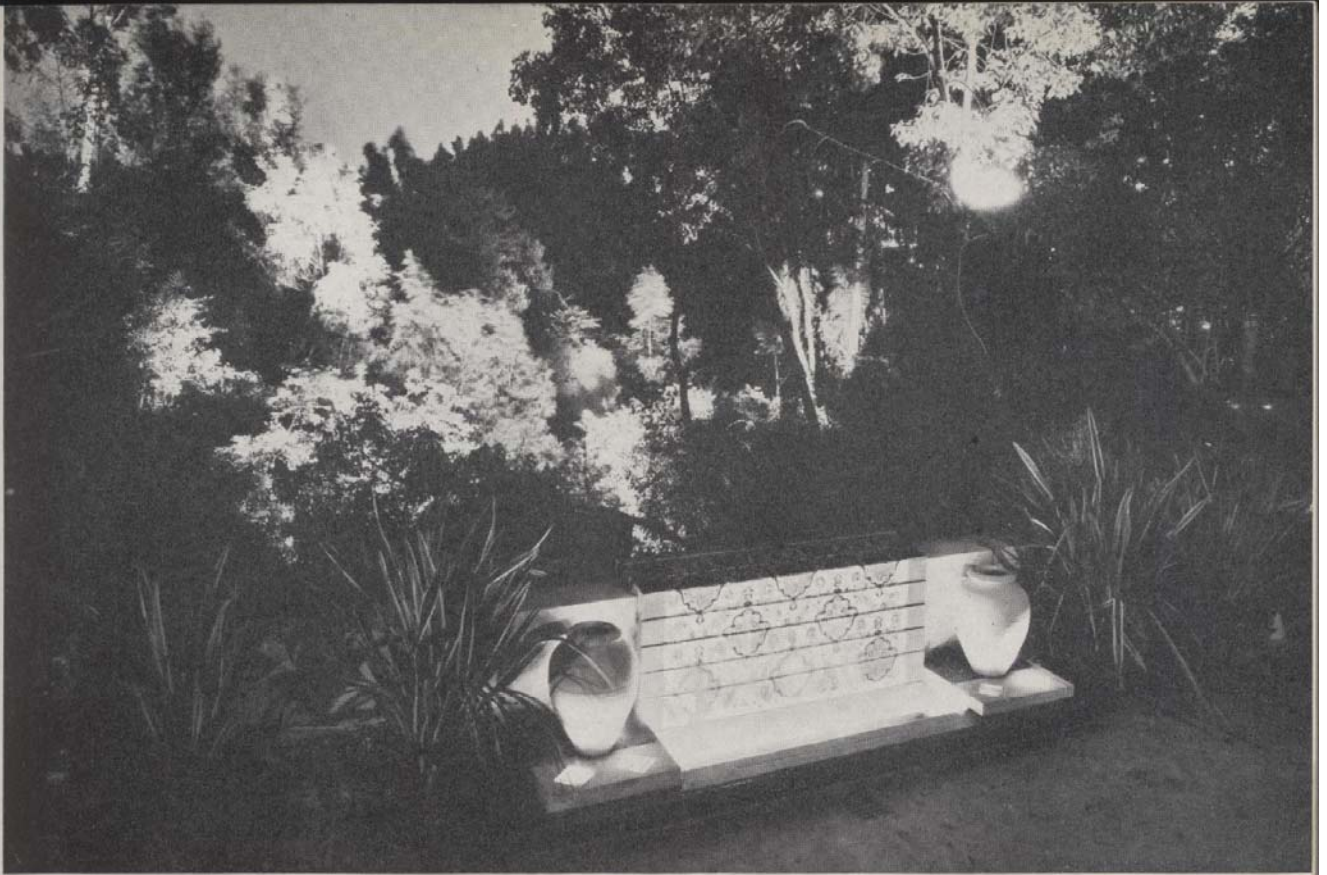




★ The famous California Tower, designed by the late Bertram Grosvenor Goodhue for the 1915 Exposition, assumed new aspects of beauty under the touch of modern illumination. Each side of the tower was bathed in white light from four 2000-watt "Sun-light" projectors placed about 350 feet away to avoid distorting the heavily modeled decorations with sharp shadows. At each of the levels inside the tower a 1000-watt wide angle floodlight, turned upward, illuminated the open arches in soft amber tones. The brightly colored mosaic dome to the rear was picked up by lens spotlights concealed in the tower and flooded from other angles by eight 1000-watt units.

★ This reproduction of the famous Casa del Rey Morro Garden in Spain formed a beautiful focal point for the open air dining terraces which overlooked it. Twelve 1000-watt lens spotlights, set in two groups about a hundred feet apart behind openings cut in the roof parapet of a building to the rear of the terraces, produced the lighting. Color screens were carefully selected for their effect on individual areas and the spotlights were cleverly focused to create highlights and luminous shadows in harmonizing tones. Concealed behind the well-head, a Spanish lantern gave warm amber "back-lights," and recessed louvered units illuminated the steps in the foreground.





★ This lovely "picture in light" attracted much attention. The pool in the foreground was cleverly lighted as shown at the left. In the ravine below, a rustic garden house concealed six 2000-watt "Sun-light" projectors which brightly painted the nearer foliage in light tints. Far off to the right, four 1000-watt units furnished interesting "back-lights" on the leaves and lighted the distant trees in darker colors. As a "lighting frame" for the picture, the boles of the trees at the upper left were lighted with shafts of bright yellow from two 250-watt spotlamps in G-E Handy Floods, and a brilliant streak of red from a 1000-watt G-E Exposition Flood pierced upward through the tree at the right.

★ All along the Avenue of Palaces, the sidewalks ran under the colonnades of the stately Spanish Colonial buildings and one viewed the street through graceful arches. Even here the lighting was tastefully and appropriately conceived and bright light sources were concealed from view. Down these covered walks, indirect lighting of a warm amber tone was provided by fixtures shaped like an inverted monastery bell with the metal finished in antique copper green. A total of three hundred of these units were used. Each contained three 40-watt amber-orange lamps and they were spaced 15 feet apart.





★ The Alcazar Gardens reproduced a section of the colorful gardens laid out by Charles V of Spain in the Imperial residence, the Alcazar in Seville.

The tower of the House of Charm, in the background, was bathed in white light from 2000-watt "Sun-light" projectors far away, and delicate foliage bordering the building formed a lacelike silhouette against walls aglow with amber light from eight 1000-watt G-E Exposition Floodlights close to the base.

For an appropriate garden lighting unit, the lighting men hit upon the idea of reproducing the famous El Camino Real bells which mark the ancient highway connecting the old Pacific Coast missions. They borrowed one of these historic old bells and had it copied in an aluminum spinning, painted green on the outside. Each unit was set with 136 green glass studs and equipped with a 300-watt lamp, as shown at the right. Mounted on their characteristic standards among the flower beds, the bells added a sparkling note and lighted the gardens effectively.



Green glass studs set in holes drilled in aluminum spinning and held by clips



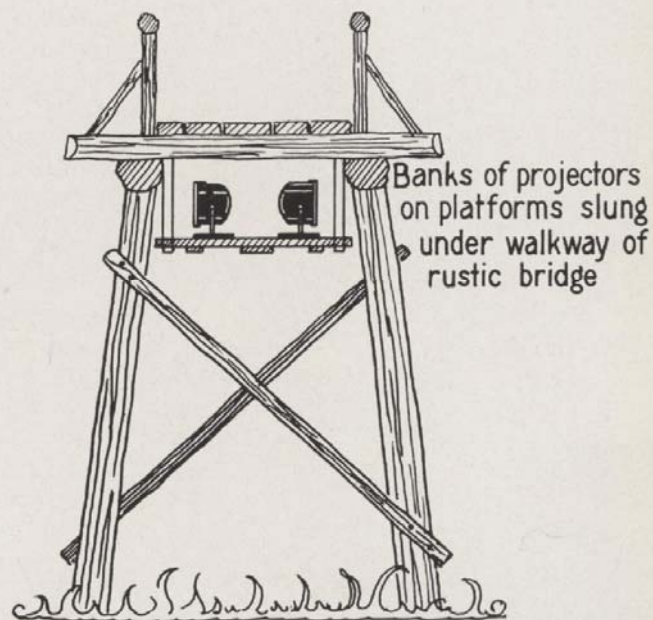
★ Crossing Palm Canyon on a rustic bridge, one looked out over the tops of a veritable jungle of tall palm trees. At night the scene took on the aspect of a billowing sea of color as powerful beams of light swept out across the mass of palm leaves.

To achieve this effect, four banks of projectors were concealed close under the walkway of the bridge on small platforms as shown. Each group of units consisted of two 2000-watt "Sun-light" projectors, two 1000-watt lens spotlights and one 1000-watt G-E Floodlight.

Color screens of light hues were selected to "paint" the foliage in patterns of pastel color. By crossing the beams from different banks of projectors, the opposite sides of the palm leaves were colored in harmonizing tones. Amethyst, pale green and blue on the tufts of greenery down the sides of the canyon created a beautiful luminous border.

In a little dell, glimpsed through the treetops, two 1000-watt G-E Exposition Floodlights with red and green lenses painted a brilliant scene in amber with red and green shadows. Five similar units directed from the undergrowth at the sides and four 1000-watt lens spotlights on the canyon floor lighted the undersides of the palms.

The bridge walk was illuminated in a subdued blue by 60-watt natural blue lamps in the Mission Bell units.





★ The Shell Oil Company building, in the form of a giant shell nearly sixty feet high was a perfect reproduction of the company's trade-mark. In this building was established the headquarters of the company's information service for visitors to the Exposition.

The center of interest in the interior was the great highway map seen at the left of the picture. This mural, done in perspective with relief effect, reproduced the curve of the Pacific slope from the Rockies to the Pacific, including western Canada and part of Mexico. More than seven feet high and thirty-eight feet long, this huge map depicted fifteen thousand miles of highway marked by tiny lamps set close together. These lamps were connected to a four-circuit chasing flasher which produced the effect of a moving band of light down the roadways.

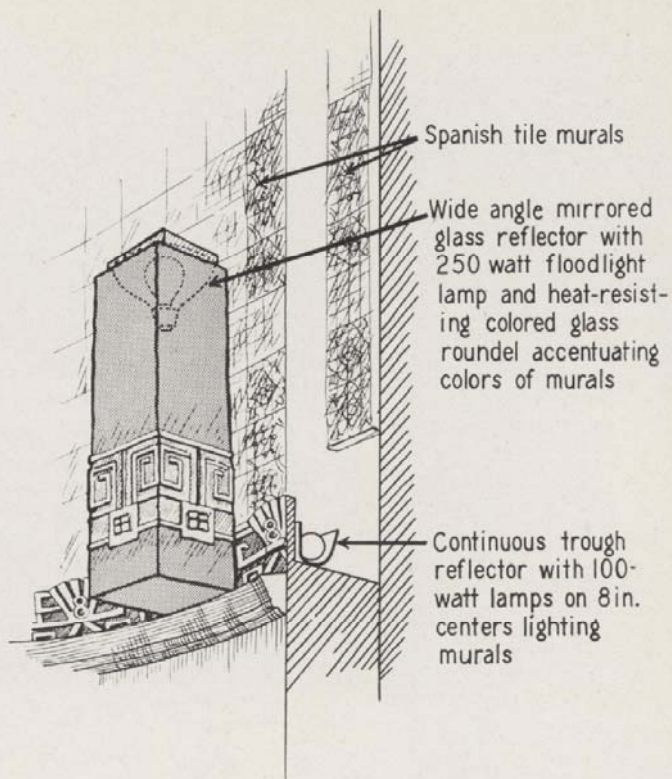
General lighting was obtained from the pleasing luminous glass fixture formed of planes and semi-cylindrical sections of opal glass in a decorative metal framework suspended from the plaster ceiling of light blue with silver stars.

At the ends of the room, were cleverly designed, glass enclosed fountains composed of a decorative metal structure holding a clear glass cylinder with gasoline flowing inside. These were set in shell-shaped niches lighted by a row of lamps concealed around the edges.

★ The California State Building, although distinctly modern in design, showed a clever combination of Spanish, Aztec and Mayan motifs in its ornamentation. Over the entranceway, brightly colored scenes on tile depicted the story of California.

To illuminate these high murals, a ledge was built out below to conceal a continuous trough reflector as illustrated. In order to accentuate the predominant colorings of the pictorial panels, it was necessary to locate powerful sources of colored light further out from the wall on a level with the bottom of the panels. This was accomplished by designing three short, free-standing pylons set out from the ledge between the pictures. In the top of each was concealed a wide angle mirrored glass reflector, tipped slightly toward the murals and equipped with the proper color roundel to bring out the hues of the adjacent scenes.

A flood of amber light on the walls flanking the entrance was produced by two 1000-watt G-E Exposition Floodlights at each side, hidden behind tropical plants. On the ground, along the extending walls, were placed trough reflectors containing 50-watt lamps on 12-inch centers and covered with amber Cel-o-glass. In the long flower boxes, near the top of the walls, striplights with 25-watt green lamps added a pleasing color variation.

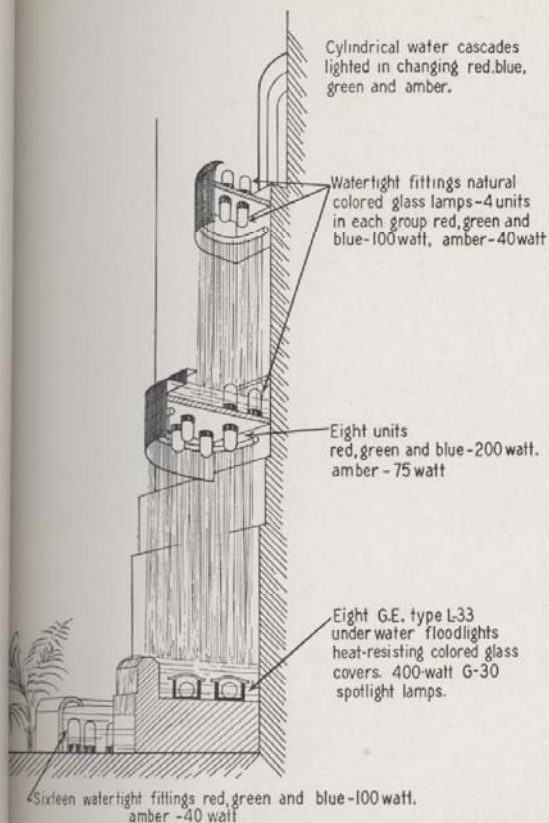




★ In the Plaza de America, the beautiful Firestone Singing Fountains were a continual source of enjoyment at night. Their constantly changing combinations of color and light varied with the volume and harmonies of music from loudspeakers at the end of the plaza.

The Palace of Electricity and Varied Industries, seen through the fountains, was another example of blended modern and ancient styles in architecture. The large bas relief plaque above the entrance was illuminated in a play of colored light and shadow from four 1000-watt G-E Exposition Floodlights, two with red and two with light blue cover plates. These were hidden on top of the marquee. From behind the plants at either side, two 1000-watt units projected light upward on each of the tall side elements. Concealed on the setback at the top, eight 500-watt wide angle floodlights illuminated the parapet above. Lighting under the marquee was from luminous glass panels set flush in the ceiling, and the outer walls were lighted in the same manner as those of the California State Building.

One of the outstanding attractions in this building was the General Electric House of Magic show presented on a revolving stage which brought the G-E Talking Kitchen before the audience at the end of the presentation.



★ The unusual feature of the Palace of Water and Transportation was the splendid series of cylindrical cascades of illuminated water flowing down the face of the building. The luminous colors of these waterfalls slowly changed and blended under the operation of a G-E Thyatron Tube Control.

At the top of the facade, the words "Water Palace" were formed of green gaseous tubes set on the faces of projecting block letters. The sculptured Indian head ornament was dimly illuminated from below by a single 60-watt inside-frosted lamp.

From the lower edges of the inverted bowl, just below this ornament, a cylindrical waterfall dropped to the basin on the marquee which contained four 400-watt G-E Underwater Floodlights, type AL-33. These were operated on separate circuits for the four colors, red, green, blue and amber. The lighting arrangement for each of the two cascades at the sides is shown in sketch.

At the tops of the huge urns, set about the large mirror pool, were flat cylindrical boxes of white diffusing glass containing four 100-watt lamps each, for lighting the courtyard. Floodlights with 1000-watt lamps flooded the building walls in amber.



★ The Libby foods display is a good example of the many well-designed exhibits seen in the general exposition buildings. Here, the rather unsightly supporting columns of the building were concealed and formed into a component part of the design by forming long luminous cylinders around them as shown. The beams and roof trusses were cleverly hidden by providing a solid canopy or false ceiling for the display. Under this, a long luminous panel furnished general lighting.

In the foreground, inside the circular counter, slowly revolved a cylindrical glass case showing many of the company's products. These items of merchandise were brightly lighted by small lamps placed close together and concealed under the extending metal hood above the cases. The huge replica of a can of Libby products, which surmounted this rotating structure, was lighted by a circle of reflectors with diffusing glass panels recessed in the false ceiling above. The spill light from these units also effectively lighted the sides of the large block letters hung from the edge of the ceiling. The long mural in the rear was lighted by trough reflectors concealed down the sides.

Many of the other displays were cleverly illuminated in a variety of interesting ways. It is reported that exhibitors' requirements for lighting ranged from 6 to 35 watts per square foot.

